

### REMARKS

Claims 1 and 4-30 are pending, with claims 1 and 30 being independent. Claims 1, 13, 23, and 30 have been amended, and claims 2 and 3 have been cancelled. Support for the amendments can be found in the originally-filed specification, at least at page 3, line 1 to page 4, line 24. No new matter has been added.

Claim 12 was objected to because the term "mirror" is found in claim 12, while the term "optical element" is found in claims 13 and 14, which depend from claim 12. Applicant requests withdrawal of this objection because claim 13 has been amended to depend from claim 11.

Claims 1, 6-11, and 25-30 have been rejected as being anticipated by U.S. Patent No. 6,970,631 (Arbore). Applicant requests withdrawal of this rejection for the following reasons.

Independent claim 1, now amended to include the limitation of original dependent claim 3, recites an optical fiber for producing laser radiation at a characteristic wavelength. The optical fiber includes a first multimode core region having a first index of refraction, and an active region embedded within the core region for producing radiation at the characteristic wavelength when pumped by pump radiation. The core region is adapted for guiding the laser radiation in a longitudinal direction of the fiber and adapted for guiding pump radiation. The active region has a sufficiently small transverse dimension such that less than about 10% of the radiation produced at the characteristic wavelength in the active region is confined to the active region. Applicant requests withdrawal of the rejection of claim 1 because Arbore fails to describe or suggest an active region in which less than about 10% of the radiation produced at the characteristic wavelength in the active region is confined to the active region.

Arbore relates to a fiber amplifier 10 including a core 12 surrounded by a depressed cladding 14, which is surrounded by a secondary cladding 16 and an outer cladding 20. See Arbore at col. 5, lines 28-41 and Fig. 1. The fiber amplifier 10 produces an intensity distribution of radiation in a core mode 24 at a wavelength  $\lambda_1$  that is less than a cutoff wavelength  $\lambda_c$  and an intensity distribution of radiation in a cladding mode 26. See Arbore at col. 5, line 58 to col. 6, line 13 and Fig. 1. However, the core 12 is not configured such that less than about 10% of the radiation produced in the core 12 is confined to the core 12. Rather, as the Examiner concedes

and as is suggested by Fig. 1 of Arbore, substantially more radiation is confined to the core 12 in Arbore's configuration.

Moreover, one of ordinary skill in the art would not have been motivated to modify Arbore to obtain such a confinement. To the contrary, Arbore teaches away from such a confinement and explains "ideally there is no coupling between the core mode 24 and the cladding mode 26" and "[c]learly, it is beneficial to reduce these causes for coupling as far as possible." See Arbore at col. 6, lines 3-14. Any attempt to reduce this coupling in the manner suggested by Arbore would also necessarily cause substantial confinement of the radiation to the core 12. For at least these reasons, applicant submits that claim 1 is allowable over Arbore.

Claims 6-11 and 25-29 depend from claim 1, and are allowable for at least the reasons that claim 1 is allowable, and for containing allowable subject matter in their own right.

Independent claim 30 recites a method of providing laser energy with a characteristic wavelength in a single optical mode to a surface. The method includes pumping an active region embedded in a multimode optical fiber with pump energy to produce the laser energy with the characteristic wavelength, guiding the generated light to the surface with the multimode fiber through a first multimode core region having a first index of refraction, and confining less than about 10% of the radiation produced at the characteristic wavelength in the active region within the active region by making the transverse dimension of the active region sufficiently small. Applicant requests withdrawal of this rejection because, as discussed above with respect to claim 1, Arbore fails to describe or suggest an active region in which less than about 10% of the radiation produced at the characteristic wavelength in the active region is confined to the active region. Accordingly, claim 30 is allowable over Arbore.

Claims 4 and 5 have been rejected as being obvious over Arbore. Claims 4 and 5 depend from claim 1, which was rejected as being anticipated by Arbore. As discussed above, claim 1 is neither anticipated by nor obvious over Arbore, and is therefore allowable over Arbore. Claims 4 and 5 are allowable for at least the reasons that claim 1 is allowable.

Claims 12-14 and 18 have been rejected as being obvious over Arbore in view of U.S. Patent No. 6,954,575 (Fermann). Claims 12-14 and 18 depend from claim 1, which was rejected

as being anticipated by Arbore. Fermann does not remedy the failure of Arbore to describe or suggest an active region in which less than about 10% of the radiation produced at the characteristic wavelength in the active region is confined to the active region, as recited in claim 1. Fermann relates to an optical fiber including a core and a cladding around the core. See Fermann at Figs. 1 and 4A-7C. However, there is no description or suggestion in Fermann that less than about 10% of the radiation produced in the core is confined in the core. For at least these reasons, any possible combination of Arbore and Fermann would still fail to describe or suggest an active region in which less than about 10% of the radiation produced at the characteristic wavelength in the active region is confined to the active region, as recited in claim 1. Claims 12-14 and 18 are therefore allowable for at least the reasons that claim 1 is allowable.

Claims 15-17 have been rejected as being obvious over Arbore in view of U.S. Patent No. 6,445,838 (Caracci). Claims 15-17 depend from claim 1, which was rejected as being anticipated by Arbore. Caracci does not remedy the failure of Arbore to describe or suggest an active region in which less than about 10% of the radiation produced at the characteristic wavelength in the active region is confined to the active region, as recited in claim 1. Caracci relates to an optical component in which optical fibers 281, 282 are mounted. See Caracci at col. 4, lines 46-56 and Fig. 1. However, there is no description or suggestion in Caracci that less than about 10% of the radiation produced in a core of the fibers 281, 282 is confined in the core. For at least these reasons, any possible combination of Arbore and Caracci would still fail to describe or suggest an active region in which less than about 10% of the radiation produced at the characteristic wavelength in the active region is confined to the active region, as recited in claim 1. Claims 15-17 are allowable for at least the reasons that claim 1 is allowable.

Claims 19 and 20 have been rejected as being obvious over Arbore in view of U.S. Patent No. 5,774,484 (Wyatt). Claims 19 and 20 depend from claim 1, which was rejected as being anticipated by Arbore. Wyatt does not remedy the failure of Arbore to describe or suggest an active region in which less than about 10% of the radiation produced at the characteristic wavelength in the active region is confined to the active region, as recited in claim 1. Wyatt relates to a laser including a multimode fiber 1. See Wyatt at col. 5, lines 15-32 and Fig. 1.

However, there is no description or suggestion in Wyatt that less than about 10% of the radiation produced in a core of the fiber 1 is confined in the core. For at least these reasons, any possible combination of Arbore and Wyatt would still fail to describe or suggest an active region in which less than about 10% of the radiation produced at the characteristic wavelength in the active region is confined to the active region, as recited in claim 1. Claims 19 and 20 are allowable for at least the reasons that claim 1 is allowable.

Claims 21-24 have been rejected as being obvious over Arbore in view of U.S. Publication No. 2002/0018287 (Zellmer). Claims 21-24 depend from claim 1, which was rejected as being anticipated by Arbore. Zellmer does not remedy the failure of Arbore to describe or suggest an active region in which less than about 10% of the radiation produced at the characteristic wavelength in the active region is confined to the active region, as recited in claim 1. Zellmer relates to a fiber optic amplifier including a radiation source 12 having a signal beam that reamplified in an active amplifier fiber 12. See Zellmer at paragraph 0019 and Fig. 1. However, there is no description or suggestion in Zellmer that less than about 10% of the radiation produced in a core of the fiber 12 is confined in the core. For at least these reasons, any possible combination of Arbore and Zellmer would still fail to describe or suggest an active region in which less than about 10% of the radiation produced at the characteristic wavelength in the active region is confined to the active region, as recited in claim 1. Claims 21-24 are allowable for at least the reasons that claim 1 is allowable.

Furthermore, each of the proposed combinations of secondary references with Arbore must be considered in light of Arbore's teachings that applicant submits would lead the ordinarily skilled artisan away from, rather than toward, the subject matter of the claims. Applicant respectfully submits that these proposed combinations fail to show a prima facie case of obviousness and request that such rejections be reconsidered and withdrawn.

The fee in the amount of \$450.00 for the two month extension of time is being paid concurrently herewith on the Electronic Filing System (EFS) by way of Deposit Account authorization. Please apply all charges or credits to Deposit Account No. 06-1050, referencing Attorney Docket Number 14624-004001.

Respectfully submitted,

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/Diana DiBerardino/  
Diana DiBerardino  
Reg. No. 45,653

Fish & Richardson P.C.  
1425 K Street, N.W.  
11th Floor  
Washington, DC 20005-3500  
Telephone: (202) 783-5070  
Facsimile: (202) 783-2331